

NATIONAL INCIDENT MANAGEMENT PROTOCOL
FOR
NATIONAL INCIDENT MANAGEMENT
ORGANIZATIONS (NIMO)

A RISK-BASED FIRE MANAGEMENT PROTOCOL
FOR *VERY HIGH* AND *EXTREME RISK* WILDLAND FIRES

VERSION 4.0

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1. ABBREVIATIONS AND ACRONYMS

AAR	A fter A ction R everview
DIR	D uring I ncident R everview
IC	I ncident C ommander
KDL	K ey D ecision L og
FFPC	F ire F ighting P roduction C apability
FSPro	F ire S pread P robability
NIMO	N ational I ncident M anagement O rganization
RAVAR	R apid A ssessment of V alues A t R isk
SCI	S tratified C ost I ndex
WFDSS	W ildland F ire D ecision S upport S ystem

2. FOREWORD

A number of difficulties and dilemmas, both external and internal to the USDA Forest Services have combined to present the agency with a daunting set of challenges that resist easy answers. The ultimate challenge over the long run will be to manage our National Forests and Grasslands in a manner that reflects improved decision making and a long-term investment in the development of fire-adapted communities. Our expectation is that the results of these efforts will yield long-term benefits on the lands we manage.

In the near term, our challenge is to improve decision-making for the small percentage of large fires that present the most complex management issues, including the exposure of incident responders to high levels of risk. Incidents of these types have sometimes been managed according to a *precautionary principle* that favors a conservative interpretation of risk. Decisions made within the context of this principle may lead to acquiring and using all resources possible in the interests of protection measures that may not be effective against a large fire. These decisions often lead to problematic outcomes with respect to safety, resource values and costs, and are not sustainable for the future.

3. GOAL AND APPLICATION OF THE PROTOCOL

The goal of this Protocol is to provide for the continuous improvement of large-fire management decision-making for all categories of wildland fire and particularly for those fires designated as *Very High* or *Extreme Risk* fires on those forests that have been prepared for this Protocol and for those incidents managed by a National Incident Management Organization (NIMO) team. Fires in these categories are those for which a high level of management response is assumed, high likelihood that firefighters will be overexposed in a long duration event, a low probability of containment precludes control of the fire, and cost estimates for fire management exceed \$5 million in the case of *Very High Risk* fires and \$10 million in the case of *Extreme Risk* fires. It is to these two categories of fires that this protocol applies. It is not to be used in other situations.

The Protocol establishes a framework for active engagement among incident managers, Agency Administrators and non-federal stakeholders. This framework is based on a collaborative approach to incident analysis and the development of incident-specific objectives. The collaboration is grounded in a three-phase approach to fire management that involves Preseason, Incident and Post-season activities designed to build capacity on local units for risk-informed decision-making.

4. INTRODUCTION

As fires grow larger and more complex they are better characterized and managed as sociopolitical events than as incidents managed according to operational concepts that emphasize engaging the fire with high levels of resources that may have low likelihood of success during extreme fire-weather events. The concept to engage a high level of resources is strongly embedded in the agency culture and may be suitable for fires up to a certain complexity level. At high levels of complexity and sociopolitical engagement, a new set of concepts is required. This protocol intends to provide guidance on these new concepts.

This Protocol transitions large, complex fire incidents to a decision frame that engages incident managers and Agency Administrators in a collaborative relationship that supports risk-informed fire management decision making as set out in this protocol. This collaboration leads to a sharing of the risk situation and an integrated approach to setting fire management objectives as a step toward developing stakeholder understanding, acceptance and support of Forest Service plans of actions and outcomes.

Background

In only a few years, a number of events have occurred that indicate the need for a new approach to large-fire management. Escalating costs as well as increased exposure of incident responders to the hazards of wildland fire have burdened the agency with the difficult task of meeting its fire management responsibilities while at the same time providing for sound management of its resource base.¹ Operations in the interests of large-fire management may lead to undesirable outcomes on the land. Federal oversight agencies have expressed concern that the decision processes associated with large fires are inconsistent.

This Protocol has been developed with multiple purposes in mind. Some of these purposes are central to internal changes in the agency, moving in the direction of a risk-based approach to fire management that is grounded in collaboration among agency personnel. The Protocol is also intended as a venue for communicating the intent and structure of this new approach to fire cooperators outside of the agency, and to those outside of fire management.

About This Protocol

The role of the protocol is to provide guidance for a NIMO team and associated Agency Administrator conducting the management of *Very High* and *Extreme Risk* fires on those specific units that have been prepared for the protocol and where the large fire will be managed by a NIMO team.. To this end, it is developed with the following intents:

- Provide a foundation for a risk-based decision-making approach.

¹ The protocol uses the term “incident responders” to refer to firefighters as well as all other associated personnel assigned to an incident and who are at-risk from incident-related factors.

- Ensure consistency of the decision process across these large, complex incidents.
- Provide a clear specification of order and flow of decision process activities.
- Assure inclusion of important decision elements and entities.
- Ensure the inclusion of state-of-the-art analytical models and tools in fire management decision-making.
- Provide definitions of key decision concepts and actions.
- Provide a basis for accurate reconstruction of an incident and the related decision processes so it is clear in review how situations appeared at the time key decisions were made.

This Protocol does not supersede nor does it preclude standard operating guidelines for fire management, particularly as identified in the Interagency Standards for Fire and Fire Aviation Operations (2009) as produced by the Standards for Fire and Fire Aviation Operations Task Group, National Interagency Fire Center, Boise, ID.

5. MANAGEMENT PHILOSOPHY

This Protocol is based on an overarching management philosophy that provides support in terms of doctrinal guidance for conducting collaborative, risk-based decision-making on *Very High* and *Extreme Risk* fires. This management philosophy identifies key elements that underlie the Protocol and that form the basis for the Protocol's orientation and rationale.

Significance of Citizen Support of the Agency Mission

Citizen support is critical to the Forest Service's mission to manage fire on the landscape in a manner that protects life and property, and stewards entrusted resources both natural and financial. As a matter of policy, Agency Administrators, using a shared leadership approach, are responsible for creating successful results with respect to incident responders' and public safety, the protection of defensible property consistent with Forest Service structure protection policy, keeping fire off of other jurisdictions where it is reasonably safe to do so, mitigation of critical landscape damage, and the realization of opportunities to reduce risk to landscapes and improve conditions consistent with Land and Resource Management Plans.

Importance of Collaborative Decision-making

The Agency Administrator is responsible for providing and articulating current resource management objectives drawn from Land and Resource Management Plans, and that include fire management objectives based on the unit Fire Management Plan. Agency Administrators, in collaboration with Incident Commanders, are responsible for articulating incident-specific objectives based on risk assessment, with emphasis on probability of success of specific fire management actions and the risk to incident responders. For any given fire

management action, risk to incident responders must be mitigated to as low a level as possible, and to a level that the Agency Administrator is comfortable that the action is worth the risk and can be completed safely.

Agency Administrators and Incident Commanders are co-responsible for effective and efficient strategy and tactics. This requires an articulation of probabilities of success of protection measures and probabilities of harm for values at risk. In addition, collaboration must acknowledge the differences in management objectives between National Forest System lands and land managed or protected by cooperators and partners.²

The Agency Administrator is responsible for initiating and establishing collaborative relationships with cooperators and stakeholders who may be impacted by a Very High or Extreme Risk incident.

Risk Communication With Stakeholders

The locus of incident decision making, as well responsibility for an incident and its outcomes, is with the Agency Administrator and senior agency leadership. Under this protocol, the Agency Administrator executes this responsibility in collaboration with the NIMO Incident Commander. Stakeholders are included through a process of risk communication that has as its aim an acknowledgement of risks posed by the incident, as well as understanding, acceptance and support of the agency's responsibilities for incident decision-making and management. Risk communication is supported by establishing relationships with stakeholders preseason and using those relationships during an incident to communicate the risk picture associated with incident management.

Risk Sharing With Upper Management

Risk-sharing relies on the ability of NIMO and the Agency Administrator to establish incident-specific objectives based on a risk-informed decision process as outlined in this protocol. Risk-sharing involves engaging upper levels of administrative authority according to features of an incident, including the level of values at risk, the probability of harm both with and without suppression action, and the likelihood of success of a fire prospect. The upward engagement of line authority in response to incident complexity and severity provides the supportive management structure for the acceptance of risk with respect to actions taken on the incident, and provides clarity with regard to the identification of the responsible decision maker. The NIMO Incident Commander is expected to encourage the Agency Administrator to engage higher levels of line officers as risk escalates. Appendix C can be used as a template for helping to make the decision regarding the appropriate authority to engage. The successful Agency Administrator and Incident Commander demonstrate good judgment by engaging appropriate officials early in the decision-making process. It is

² In the case of Unified Command, the relationship between non-federal fire cooperators (e.g., Calfire) and the Forest Service (i.e., NIMO and the Agency Administrator) is collaborative. Otherwise, the relationship is cooperative.

important to note that for some incident scenarios it is very appropriate to suggest engaging officials above the Chief.

Role of the Agency Administrator

The primary role of the Agency Administrator is one of *risk manager*. *Very High* and *Extreme Risk* fires predispose risk managers to make risk tradeoff decisions. Decisions to protect values at risk inherently require exposing incident responders to hazards. The challenge for the risk manager is to assess the tradeoffs between protection of values at risk and exposure of incident responders particularly in instances where stakeholders demand that more risk be taken to protect their values of interest. Often, an Agency Administrator and an Incident Commander have made decisions that in effect marginally decrease the probability of harm to values at risk in return for excessive increases in risk to incident responders. The successful Agency Administrator and NIMO Incident Commander will be alert to situations where firefighting resources are deployed on a mission that has a low probability of success and therefore where resources cannot realize near their full production potential. Deploying incident responders on a mission that has a low probability of success is an example of requiring firefighters to accept unnecessary risk and must be avoided.

Risk managers have the duty to direct and work with Incident Commanders to develop strategies and tactics that eliminate or mitigate risk to incident responders and the public. The federal wildland fire policy has as its opening guiding principle “Firefighter and public safety is the first priority in every fire management activity.” Toward that end, it is a universal principle that Agency Administrators should accept no unnecessary risks or unnecessarily expose incident responders to the potential for harm. Mitigation of risk to incident responders should not result in the transfer of risk to non-federal fire cooperators or to the public. It is important to note that directing incident responders to accomplish an objective using a low probability of success strategy may be an example of transferring risk unnecessarily to incident responders. The successful risk manager will anticipate and manage risks by planning, facilitating and implementing decisions made at the appropriate level, and engaging the fire where success can reasonably be achieved both in time and space.

Measured Use of Fire Management Resources

Currently, it is common practice to respond to *Very High* and *Extreme Risk* fires with insufficient concern for the transfer of risk to incident responders brought about by high levels of resources applied to an incident. This protocol envisions a very thoughtful and intentional weighing of potential success of the mission against potential harm to incident responders. For all incidents managed under this protocol the following paramount question should be addressed: Is the potential success of the mission worth the amount of exposure and associated cumulative risk to incident responders? In practice, the Agency Administrator and Incident Commander must estimate how much fire fighting production potential is required to achieve the fire prospect and then decide if the potential gains outweigh the potential risk to

incident personnel. As a matter of reference, the selected fire prospect perimeter, measured in chains, defines the reference fire fighting production capability required for success.

For all *Very High* and *Extreme Risk* fire, fire management response is no more and no less than what is required to meet reasonable objectives, and is viewed as a good investment of taxpayer capital as understood, accepted, supported and based on risk-informed, documented decisions. Federal wildland fire management policy states, “Sound risk management is a foundation for all fire management activities. Risks and uncertainties relating to fire management activities must be understood, analyzed, communicated, and managed as they relate to the cost of either doing or not doing an activity. Net gains to the public benefit will be an important component of decisions.”

Approximately 0.25% of incidents for which the Forest Service has management responsibility have the potential to exhibit fire behavior that puts the agency at-risk of making costly investments by using massive amounts of people, equipment, and aircraft with a low probability that those efforts will successfully meet objectives. Therefore, using this Protocol, we commit to a concept of utilizing speed, agility, and focus as our organizational mantra as opposed to overwhelming mass.

6. PRESEASON PROTOCOL

This section defines preseason activities accomplished in advance of implementing the protocol during an incident. Success of the protocol is predicated on an integrated relationship between the NIMO team and the Agency Administrator, and effective communication with non-federal fire and emergency cooperators and public stakeholders. Relationship building is initiated before the incident and before the active fire season. The purpose of the relationship is to achieve a common understanding, language and communication pattern that supports the principles of risk-based incident management, risk communication and risk sharing outlined in the protocol.

Identification of Forests At-risk for *Very High Risk* and *Extreme Risk* Fires

A preseason identification of forests at-risk for a *Very High* or *Extreme Risk* fire will be conducted by the Regional Foresters and Washington Office Staff, including NIMO. Forests thus identified will serve as target forests for the preseason protocol.

Capacity Building

Preseason activity is primarily focused on building capacity to effectively manage *Very High* and *Extreme Risk* fires. Capacity building in this context refers to the development of (a) a working knowledge of decision support tools, products and applications relevant to incident management, (b) an understanding and facility with the Incident Risk Assessment Framework used to characterize the values at risk on an incident, the expected effectiveness of fire management prospects and the level of exposure of incident personnel and the public to hazards, (c) the capacity to develop and maintain a collaborative relationship between the NIMO Incident Commander and the Agency Administrator, (d) the capability to make risk-informed decisions jointly between the NIMO Incident Commander and the Agency Administrator, and (e), the ability to communicate the risk picture to non-federal and public stakeholders that may be impacted by an incident.

Preseason Learning

Preseason learning workshops will be conducted with units identified as at-risk for a *Very High* or *Extreme Risk* fire. Learning will be comprised of three components. One component is interaction with the Regional Leadership Teams in order to make the case for change, gain understanding of the problem and understand proposed solution strategies. This engagement also provides an orientation on the upcoming season, including the protocols that support and aid fire management decision-making.

A second component will be learning workshops with at-risk forests. The key objectives of this level of engagement will be to build capacity in support of (a) the joint preparation of

incident risk assessments, (b) the capability to make quality risk-informed decisions, (c) risk communication with non-federal cooperators and stakeholders, and (d) risk-sharing with upward levels of management authority. This component will engage Agency Administrators and relevant staff at the forest level in simulation exercises. The simulations will include scenarios that involve decisions on incidents that have high values at risk but with no identified protection measure that is possible or practical given a reasonable probability of success and minimal exposure of firefighters to harm.

Case Studies

Case studies will be used to simulate incident and information conditions likely to be present at the time of an incident on a unit identified as at-risk to have a *Very High* or *Extreme Risk* fire. Incidents suitable for simulation will be developed collaboratively between the NIMO team, fire managers, and the Agency Administrator.

The case studies will utilize Wildland Fire Decision Support System (WFDSS) analyses similar to those anticipated for an actual incident occurring during the fire season. Case studies will apply the Incident Risk Assessment Framework to identify and evaluate fire management prospects consistent with their expected effectiveness and the degree to which such prospects expose incident personnel and the public to hazards. Strategies and tactics will be developed in consultation and collaboration with the NIMO team and the Agency Administrator, including other cooperators and stakeholders as appropriate.

Community Preparedness and Stakeholder Communication

A central focus of preseason work with forests at-risk for a *Very High* or *Extreme Risk* fire is building capacity with respect to community preparedness. The Agency Administrator is responsible for insuring that relationships with community leaders are strong and that capacity for effective risk communication is high.

Collaboration With The Agency Administrator

The NIMO team will endeavor to create a collaborative and consultative relationship with Agency Administrators at all levels of management, and particularly Agency Administrators on forests identified as at-risk for a *Very High* or *Extreme Risk* fire. In addition, the NIMO team will provide consultation to the Agency Administrator on the development of relationships with non-federal fire cooperators and other stakeholders with respect to the risk-based decision making approach as identified in this protocol as a basis for risk communication at the time of an incident.

7. INCIDENT PROTOCOL

Risk Classification of Fires

Risk classification of fires will be done according to the National Fire Suppression Risk Management Protocol. Fires assigned a risk classification of *Very High* and *Extreme Risk* are subject to management under this protocol.

Initial Engagement

When a NIMO team undertakes management of an incident, implement the appropriate protocol and order decision support information from the National Fire Decision Support Center (Boise, ID). The NIMO team will initialize its engagement with the local unit through contact with the Agency Administrator. The initial meeting with the Agency Administrator will be used to assess local unit capacity for implementing the protocol. In addition, the first meeting will be used to jointly prepare and execute the Agency Administrator Letter of Delegation.

Engagement of the National Fire Decision Support Center

The initial step in incident engagement is the ordering and receipt of WFDSS analyses, including (a) an FSPro analysis based on fire ignition point, fuels and weather conditions to identify the probability contours for fire spread given no suppression action, and (b) a RAVAR analysis to determine the values at risk given differing levels of exposure to fire under a no-action reference. The NIMO team is responsible for ordering and receiving these analyses. Requests for analyses will be placed with the National Fire Decision Support Center (Boise, ID) where the analyses will be completed, with results and interpretation provided as needed to Incident Commanders and Agency Administrators.

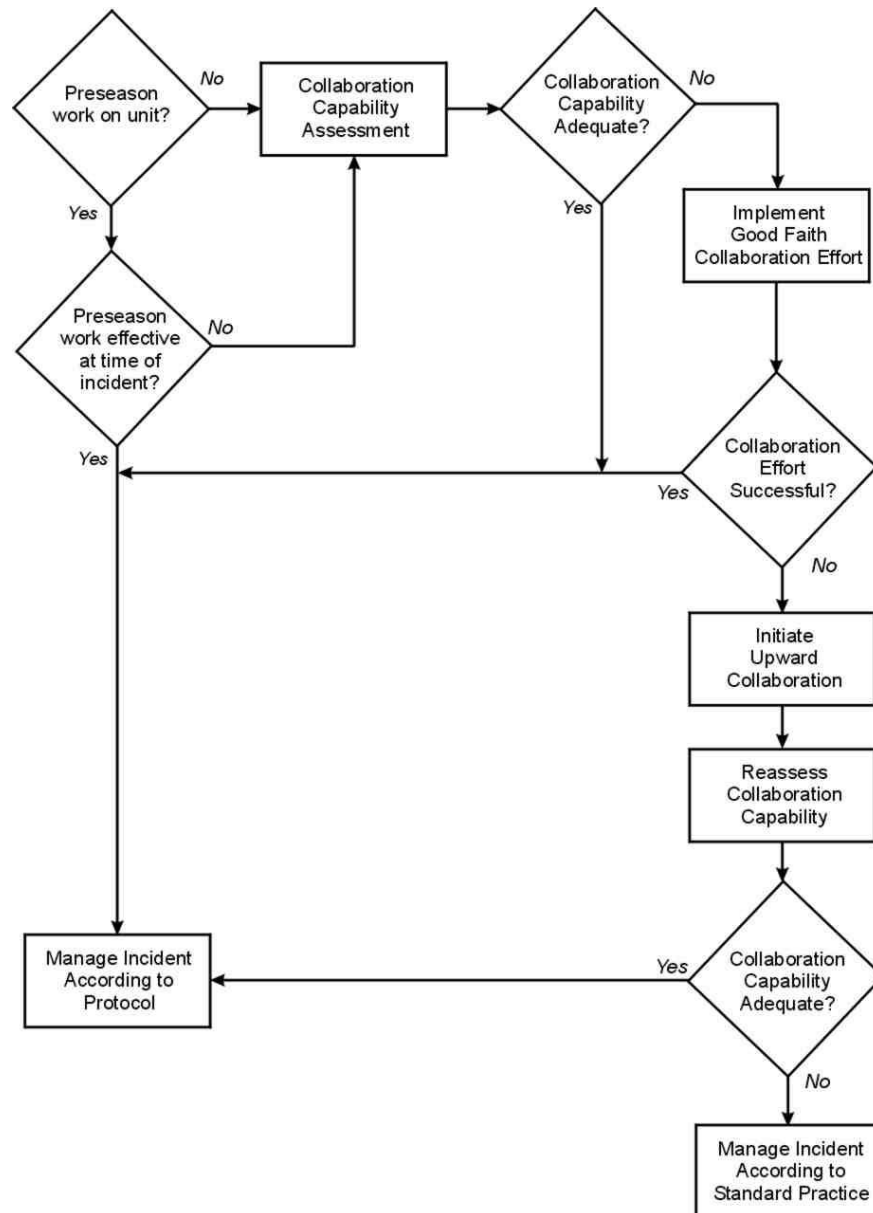
Protocol Applicability At Time of Incident

Collaborative engagement between the NIMO team, the Agency Administrator and non-federal cooperators and stakeholders is the essence of this protocol. The NIMO team and the Agency Administrator will undertake a determination of the ability of the local unit to work collaboratively and effectively with the protocol. Figure 1 provides a standard procedure for this determination.

If preseason work was done with the unit, the NIMO team and the Agency Administrator will conduct an initial review to determine if the preseason work is likely to be effective at the time of the incident. If the preseason work was either (a) not done or (b) not done sufficiently, or changes in Agency Administrator occurred between the preseason work and the incident, the NIMO team and the Agency Administrator will conduct a collaboration capability assessment. The collaboration capability assessment will be based on a review of

existing preseason work, including (but not limited to) timeliness and accuracy of relevant data sets (e.g., fuels, terrain), and an assessment of the Agency Administrator's capability to articulate strategic objectives for the unit and engage the NIMO team in an incident risk assessment, including the development of incident-specific objectives. The collaboration capability assessment will also take into consideration the WFDSS analyses and the Complexity Analysis.

If the result of the capability assessment is negative, the NIMO team and the Agency Administrator will make a good faith effort to work under the protocol. If the effort is successful, the incident will continue to be managed collaboratively. If the effort is unsuccessful, the NIMO team and the Agency Administrator will initiate a process of upward collaboration to engage, at a minimum, the Regional Forester with a briefing of the local situation. The NIMO team, Agency Administrator and Regional Forester will then reassess their capability to engage in collaborative management of the incident with the inclusion of a higher level of line authority. If this assessment is positive, the incident will continue to be managed under the protocol. If the assessment is negative, the NIMO team will revise its incident management approach consistent with expectations that are in line with the management situation. In these cases, the Delegation of Authority may come from levels above the local Agency Administrator.

Figure 1. Standard procedure for assessing protocol applicability at time of incident.

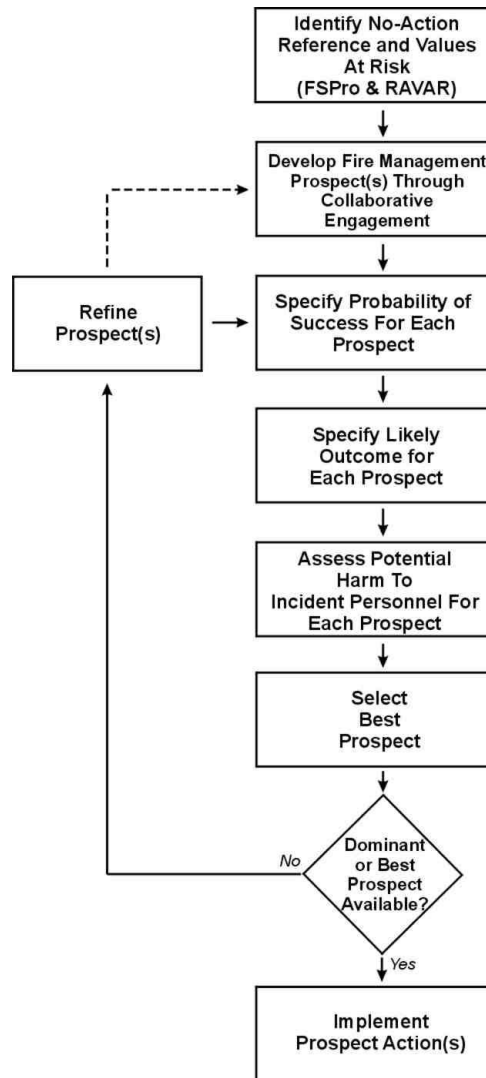
Incident Risk Assessment Framework

The purpose of the Incident Risk Assessment Framework is to support collaborative risk-based fire management decisions by giving explicit representation and consideration to values at risk due to fire, the likelihood that harm to those values will occur, the expected effectiveness of fire management prospects, and the level of exposure of incident responders

and the public to harm. The Framework can be applied to an entire incident, or to portions of an incident where it is reasonable and appropriate to conduct a focused risk assessment.

Figure 2 provides a standard procedure for implementing the Framework.

Figure 2. Standard procedure for implementing the Incident Risk Assessment Framework.



Identification of Values At Risk

The analysis of an incident based on the Incident Risk Assessment Framework is initiated using the WFDSS FSPro and RAVAR analyses (see above) to identify values at risk and the probability of harm to those values under a no-action reference. The NIMO in collaboration with the Agency Administrator will identify additional values at risk as appropriate for the

incident and based on FSPro analyses. These can include, but are not limited to, risks to environmental values, economic values and sociopolitical values.

Fire Prospect Model For Defining Success

Defining success for fire management actions will be based on constructing an outcome scenario using a fire prospect modeling approach. A fire prospect model begins by specifying the outcomes that are desired and is developed by addressing key questions concerning (a) where the expected final boundary of the fire is located, (b) where and when the fire can be engaged with a high probability of success, and (c) how much Fire Fighting Production Capability (FFPC) should be invested to achieve the outcome identified in the prospect.³

The fire prospect scenario should be designed to create outcomes and characteristics that are consistent with the management philosophy identified in this Protocol as well as other standards that provide agency guidance for fire management. These include, but are not limited to, (a) safe outcomes for incident personnel and the public, (b) defendable property protection consistent with Forest Service structure protection policy and the structure protection policies of cooperators and partners, (c) protection of natural resources, (d) effective and efficient use of fire management resources, (e) use of resources only in those situations where success is reasonably achievable, and (f) application of a decision process that is open, documented, available for review and can be reconstructed at time of review.

Design of the fire prospect scenario is the joint responsibility of the NIMO team and the Agency Administrator, and is developed by considering (a) the unit Land and Resource Management Plan and the Fire Management Plan, (b) technical tools and models appropriate to fire management (e.g., FSPro, RAVAR, SCI), (c) the FSPro Probability of Containment, (d) weather forecasts, (e) fuel condition maps, and (f) professional judgment.

The fire prospect scenario will contain the following information: (a) a fire prospect map that includes expected boundaries of the controlled fire, (b) expected size of the fire in acres, (c) expected perimeter of the fire in chains, (d) expected FFPC needed to conclude the fire, (e) expected number of structures at risk, (f) list of resource values at risk, (g) expected political and social issues, and (h) a network map or other identification of stakeholder relationships.

Identification of Expected Outcomes and Probability of Success

For each fire management prospect, the Incident Risk Assessment Framework will specify the likelihood of success with respect to each of the identified values at risk taking into consideration (a) expected weather conditions, (b) fuel conditions with respect to hazardousness, and the FSPro Probability of Containment. A general approach for guiding this estimation is contained in Appendix B.

In addition, success will be specified in terms of likely outcomes in the unit of measurement appropriate to each value at risk included in the Incident Risk Assessment

³ The term Fire Fighting Production Capability” (FFPC) is used here to refer to both ground and air resources.

Framework analysis. These units of measurement will be the same as those used to characterize loss under the no-action reference. Likely outcomes can be represented in number of ways, including (but not limited to) (a) a point estimate based on professional judgment that considers the probability of success and the number of units at risk, (b) the expected value obtained by multiplying the number of units exposed by the probability of success, and (c) a range based on professional judgment that represents the high and low boundaries of expected outcomes.

In assessing probabilities of success for fire prospects that have multiple interdependent segments (e.g., multiple fireline segments, multiple point protection locations) each of which has a moderate probability of success, the overall probability may be quite low due to the multiplicative combination of probabilities of these events. Also, probability of success can be further reduced when a causal chain of events is required for success to occur (e.g., arrival of needed resources at the time anticipated).

Assessing Appropriate Fire Fighting Production Capability (FFPC) to Risk to Achieve the Mission - Measured Use of Fire Management Resources

For each contemplated prospect fire, calculate how much FFPC to risk in achieving the mission. For purposes of calculation, use the standard incident FFPC production rate assumptions in Appendix D as guidelines. For example, determine how many Type 1 crews will be needed for how many days and multiply by the cumulative total times the production rate per day and then multiply by the estimated productive time productive. FFPC estimates can be adjusted to account for extraordinary circumstance.

Assessment of Potential Harm to Incident Responders and the Public

For each fire management prospect, an assessment will be made with regard to the expected exposure of incident responders and the public to potential harm. This assessment should take into consideration a number of factors including (but not limited to) (a) the number of incident responders required to achieve success, (b) the amount of time that incident responders and the public will be exposed to incident hazards, (c) the fire behavior associated with incident operations, (d) the environmental conditions under which incident responders will be working, (e) the level of fatigue associated with operations, (f) the level of training and qualification of incident responders, (g) hazards associated with transportation of incident responders to the incident, from the incident and while on the incident, including both ground and air transportation, and (h) the level of experience and qualification of the incident responders. Each fire management prospect should have an identified mitigation measure if the unmitigated probability of harm to firefighters exceeds the decision makers' comfort level.

Potential harm to incident responders can be assessed a number of ways including (but not limited to) (a) a measure of exposure in terms of person-hours or person-days based on anticipated operations, (b) statistical analyses of mortality and morbidity based on previous

seasons of mobilization and operations, (c) professional judgment with respect to the proposed actions compared with previous cases or situations, or (d) professional judgments based on the factors identified above and expressed in qualitative terms such as low, average or high.

Under no conditions should mitigation of risk to incident responders result in a transfer of risk to fire cooperators or to the public.

Decision Protocol

Decision-making is both an art and a science, particularly under conditions of emergency response where risk can be extreme and uncertainty regarding outcome is high. Because decisions that Agency Administrators and Incident Commanders make are key drivers of safety, land health and cost outcomes, quality decisions are imperative for successful results. In addition, government decisions must meet the standard of not being deemed arbitrary and/or capricious. In order to be successful, a decision maker must meet a minimal protocol for making decisions.

First, decision-makers should decide from among a set of documented alternatives and base decisions on a documented set of decision-making criteria.

Second, decision-makers should systematically compare the relative advantages between one or more fire management prospects and a no-action reference. In cases where multiple fire management prospects are available, the comparison should also compare prospects with each other and with a no-action reference. The decision as to which fire management prospect to implement is based on the assessed probability of success and likely outcomes, consistent with committing personnel only to the extent necessary to achieve the objectives safely. If a dominant prospect is present, and is consistent with minimal exposure of incident responders to hazards, then this prospect is the best prospect. A dominant prospect is one that is the best prospect across all categories of values at risk. If a dominant prospect is not present, then choose the prospect that offers the best tradeoff across all categories of values at risk, consistent with minimal exposure of incident responders to hazards. If no prospect satisfies the above conditions, then refine the prospects available or construct additional prospects that provide a reasonable probability of success and re-evaluate.

Third, the decision-maker should be sensitive in the context of *Very High* and *Extreme Risk* fires to the possibility that the difference in outcome between a proposed prospect and a no-action reference is either not significant or not sufficiently large to justify the level of exposure of firefighters to potential harm associated with a proposed prospect.

Fourth, the decision-maker should review the decision with all relevant and appropriate stakeholders taking into consideration the concept of risk-sharing as established in this protocol.

Fifth, the decision-maker should document the decision.

Sixth, the decision-maker should implement and monitor the decision with respect to outcomes. Implemented actions must have a reasonable probability of success and a probability of harming firefighters that is mitigated to a level below the decision makers' comfort level.

Seventh, the decision-maker should modify decision if results and/or conditions warrant reconsideration.

Eighth, after the action based on the selected prospect is completed, the decision-maker should review results and the decision to determine future possible improvements.

Example Format for the Incident Risk Assessment Framework

An example format for the Incident Risk Assessment Framework is shown in Appendix A. This example is intended as a general format for conducting a collaborative risk assessment that engages NIMO and an Agency Administrator. This assessment should serve as the basis for a risk-informed determination of a fire management action that leads to achieving incident-specific objectives with minimal exposure of incident responders to hazards.

Risk Sharing and Decision Authority

Successful Agency Administrators and NIMO Incident Commanders will anticipate the need to share risk vertically in the organization. It is important to engage higher-level authority in a timely fashion, and before strategies having a low probability of success are deployed.

Risk sharing and line-level decision authority will be based on features of an incident identified in the Incident Risk Assessment Framework, including the level of values at risk, the probability of harm without suppression action, and the likelihood of success given alternative suppression actions. Appendix D contains a Risk Sharing Protocol to aid identifying the appropriate decision authority for incidents based on these factors.⁴

Resource Ordering and Utilization

Resource ordering will be based on fire management objectives established collaboratively through the Incident Risk Assessment Framework, and will be consistent with the effectiveness of fire management strategies and tactics identified, as well as firefighter hazard exposure associated with the type and amount of resources ordered.

Appropriate risk management will base resource ordering on a risk-informed prospect for the fire, and consideration of sufficient firefighting production capability to successfully engage the Fire Prospect Perimeter. By this standard it is generally *inappropriate* to acquire, keep and/or use resources that exceed the fire prospect or are not efficiently and effectively utilized. Decisions to acquire and/or use more resources than necessary, and/or to expose

⁴ The Risk Sharing Protocol is specific to the Forest Service and does not necessarily correspond to the upward management levels of other organizations.

more firefighters than required, to achieve reasonable objectives must be made with consultation from higher levels of leadership. In extreme cases where a decision involves firefighter exposure to hazards in pursuit of a low probability of success strategy, the Agency Administrator must consult with the most senior level leadership prior to making the decision to accept unnecessary risk to firefighters.

The Agency Administrator and NIMO Incident Commander are jointly responsible for delivering a successful risk-informed measured response as described in this protocol.

Ongoing Cost Evaluation

An ongoing evaluation of incident costs will be done using the Maximum Estimated Cost metric, which uses the Stratified Cost Index (SCI) in WFDSS, as a basis for comparing current incident costs with those on fires with similar characteristics. The Maximum Estimated Cost metric is calculated by multiplying a risk-adjusted SCI by the acres contained within the Fire Prospect. This metric is dynamic in response to incident progression and changes in conditions. NIMO will be responsible for ordering and receiving the estimated cost metric, and will collaborate with the agency administrator in the cost review. Cost evaluation will be done at periodic intervals, and at least every day. Ongoing cost evaluation will be used for oversight monitoring and reporting and is not intended to be a budget for the incident.

During-Incident Review (DIR)

The intent of during-incident reviews is to (a) provide periodic review of the incident and its management, and (b) maintain the vitality of the collaborative relationship between the Incident Commander, the Agency Administrator and other non-federal stakeholders as appropriate.

During-incident reviews will be conducted at regular intervals, at least weekly and at significant changes in fire behavior. The reviews will be done collaboratively between the Incident Commander and the Agency Administrator. Information in support of the review may be gathered from cooperators and stakeholders as deemed appropriate.

The reviews should focus on three basic issues: (a) what is working properly on the incident, (b) what is not working properly on the incident, and (c) what changes need to be made and how can they be brought about. These reviews should be documented and notes retained for future use and review.

After-Action Review (AAR)

The NIMO Incident Commander will initiate and facilitate an Incident After Action Review with the Agency Administrator. Information in support of the review may be gathered from cooperators and stakeholders as deemed appropriate.

The review will address three key questions: (a) What worked on the incident? (b) What did not work well on the incident? And (c) What can be improved on for the future? The reviews should be document and notes retained for future use and review.

Incident Performance Information

Incident Performance Information will be collected according to the information requirements identified in the National Fire Monitoring Protocol. The NIMO team will be responsible for collecting and managing information pertaining to key elements of incident decisions including decision-relevant information from WFDSS, the incident complexity analysis, the Incident Risk Assessment Framework (e.g., actions, objectives, expected effectiveness, risks to incident responders), strategies and tactics, and results of during-incident reviews.

8. POST-SEASON PROTOCOL

The intent of the post-season protocol is to establish a basis for a continuous learning process by which fire management decision-making is improved through a thorough post-season review of season performance. The results of the review process lead to refinement of the quality of fire management decision-making.

Conduct of After-Action Reviews (AAR)

After Action Reviews will be undertaken for all *Extreme Risk* fires and for a sample of *Very High Risk* fires. The review team will include representatives that are peers of the Agency Administrator and the Incident Commander. AAR's should review incident outcomes relative to stated goals and objectives as identified in the Incident Risk Assessment Framework as well as other incident documentation.

The review must focus on the quality of decisions made during the incident. To accomplish this intent, decisions will need to be reconstructed from the Incident Risk Assessment Framework and other sources of incident documentation including, for example, the Key Decision Log (KDL).

The quality of incident decisions will be evaluated based on the prudent Agency Administrator and Incident Commander rule and from the perspective at the time the decision was made – not in hindsight with perfect information. The purpose of the review is to not second-guess decisions, but to learn how to improve decisions.

Results of the review must have the benefit of peer review and be published on the FAM Web.

Performance Measures

These will come from two sources: (a) performance measures established by the NIMO teams for their internal use, and (b) from a research-based performance measurement group. Key performance measures will include, but will not be limited to (a) reductions in exposure of fire fighters to hazards, (b) changes in the effectiveness of fire management actions, (c) improvements in collaboration between incident managers (e.g., NIMO teams) and agency administrators, and (d) changes in the role of risk assessment in determining fire management actions.

Refinement of Fire Management Decision-making

The results of the post-season review process will serve to guide modifications to the protocol for use in the succeeding year.

Technology Transfer

Recommendations for improvement to WFDSS. Recommendations can include improvements in format, data requirements and delivery. Also, may make recommendations for new decision support tools or tools to improve the collaboration process between NIMO teams, agency administrators and outside stakeholders. These can include improved formatting of analyses, delivery of analysis and training for non-technical stakeholders.

9. BIBLIOGRAPHY AND REFERENCES

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10. APPENDICES

Appendix A – Example Format For Incident Risk Assessment Framework

Appendix B – Probability of Success Estimation Matrices

Appendix C – Risk Sharing Protocol

Appendix D – Standard Average Fire Fighting Production Capability (FFPC) Assumptions